

COBALT-DOPED SATURABLE ABSORBER  
Q-SWITCHES AND LASER SYSTEMS

ABSTRACT OF THE DISCLOSURE

A saturable absorber Q-switch includes a monocrystalline lattice having the  
5 formula  $Mg_{1-x}Co_xAl_yO_z$  where x is greater than 0 and less than 1, y is greater than 2 and  
less than about 8, and z is between about 4 and 13. The lattice has tetrahedral and  
octahedral positions, and most of the magnesium and cobalt occupy tetrahedral  
positions. In one embodiment, the molar ratio of aluminum to the combined amount of  
magnesium and cobalt in the monocrystalline lattice can be controlled during growth of  
10 the monocrystalline lattice to thereby form a saturable absorber Q-switch that exhibits a  
 $^4T_1$  spectrum for the cobalt ion of at least about 1544  $\mu m$ . In another embodiment, a  
laser system, such as an Er:Yr:glass laser system, includes a saturable absorber Q-switch  
that includes a monocrystalline lattice wherein the molar ratio of aluminum to the  
combined amounts of magnesium and cobalt exceeds 2:1, and preferably is about 6:1,  
15 and wherein essentially all of the magnesium and cobalt components of the  
monocrystalline occupy tetrahedral positions of the lattice.